

RE: BLIP Raster AIP Response to Recommendation

Gillo, Jehanne [Jehanne.Gillo@science.doe.gov]

Sent: Wednesday, December 03, 2014 10:01 AM**To:** Fischer, Wolfram**Cc:** Garland, Marc [Marc.Garland@science.doe.gov]; Mueller, Berndt; Roser, Thomas; Michnoff, Robert J; Mirabella, Kerry A; Mausner, Leonard

Thank you Wolfram. Your responses have clearly addressed our questions.

Best regards,
Jehanne

-----Original Message-----

From: Fischer, Wolfram [<mailto:wfischer@bnl.gov>]

Sent: Monday, December 01, 2014 9:24 PM

To: Gillo, Jehanne

Cc: Garland, Marc; Mueller, Berndt; Roser, Thomas; Michnoff, Robert J; Mirabella, Kerry A; Mausner, Leonard

Subject: Re: BLIP Raster AIP Response to Recommendation

Dear Jehanne,

please find additional information below.

Best regards,

Wolfram

> Thank you for your response. We do have a few additional questions regarding the rationale that emissions will be acceptable. Basically, the rationale is that maintaining $\leq 1''$ in water gaps will result in acceptable emissions even with an increase in current to 125 μA because more protons will interact with the RbCl target material (target material will no longer expand out of the beam area). This raises two concerns:

> . The linac intensity upgrade will increase current to $\sim 140 \mu\text{A}$ - can the rationale be extended to that current? Probably, because the site boundary dose only reaches 3% of the limit, but it should be stated that currents up to 140 μA will be acceptable.

Our primary goal is to maintain the surrounding grounds as an Uncontrolled Area.

The width of the water gap is only one variable that controls the emission, and a gap width of approximately 1" is a reasonable guidance. Other factors need to be considered, for example, the water flow rate, stack height, nearby tree height, run duration, beam energy and beam current all have an effect on the emission. The extra 15% of intensity increases the total air emission only slightly, still <4% of the EPA limit. The length of BLIP operations and the beam energy can have a larger impact.

> . If credit is taken for proton interaction with targets vs. cooling water, what happens if other targets are irradiated? While the logic applied to RbCl target behavior makes sense, what about irradiating targets other than RbCl (e.g., Th targets for Ac-225 production, materials testing targets)?

Irrespective of the beam profile (with or without raster), targets placed upstream of the RbCl targets (such as Th targets and Nick Simos' targets) attenuate the number of protons reaching the RbCl targets due to particle interactions. For Th targets using 200 MeV this is an 18-20% reduction in fluence on the downstream RbCl targets AND the water gaps and would therefore reduce the water activation. At the same time, of course the extra irradiated water upstream increases water activation.

> We would appreciate it if you could provide us with this additional information. By the way, we have decided that the DOE will no longer conduct annual reviews of the BLIP Raster Project. However, we encourage you to do so and to inform us of their conduct. We will continue to monitor the BLIP Raster project during the BNL AIP calls and we will conduct the closeout review of the AIP project.

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> Thank you-

> Jehanne

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> Cassie Dukes

> Assistant to Dr. Jehanne Gillo

> Facilities and Project Management Division DOE Isotope Program Office

> of Nuclear Physics, SC-26.2 Office of Science

> Tel: 301-903-1455

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> -----Original Message-----

> From: Fischer, Wolfram [<mailto:wfischer@bnl.gov>]

> Sent: Monday, September 15, 2014 8:29 AM

> To: Gillo, Jehanne; Shinn, Michelle; Garland, Marc

> Cc: Dukes, Cassie; Mueller, Berndt; Roser, Thomas; Michnoff, Robert J;

> Mirabella, Kerry A; Mausner, Leonard

> Subject: BLIP Raster AIP Response to Recommendation

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> Dear Jehanne, Michelle, and Marc,

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> please find attached the response to a recommendation from the BLIP Raster AIP review, 12-13 September 2013:

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> "Identify controls that will be in place to insure water thickness is maintained to minimize radioactive gas emission. Submit to DOE by September 30, 2014."

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> Best regards,

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> Wolfram

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> Wolfram Fischer

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